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ABSTRACT

This document, one of five volumes designed to train educational research and development personnel in the instructional development process, describes the program materials and provides instructions for their use. This volume is divided into three sections: an introduction, a description of how to use the program, and a detailed schedule to program activities. The introduction includes the following topics: (a) the purpose of the program, (b) program components, (c) rationale of the program format, (d) program content, and (e) program evaluation. Section 2 includes an overview of the activities, behavioral objectives, feedback for practice exercises, and a description of evaluation progress and administering the program. Section 3 gives time requirements and assignments. (PD)

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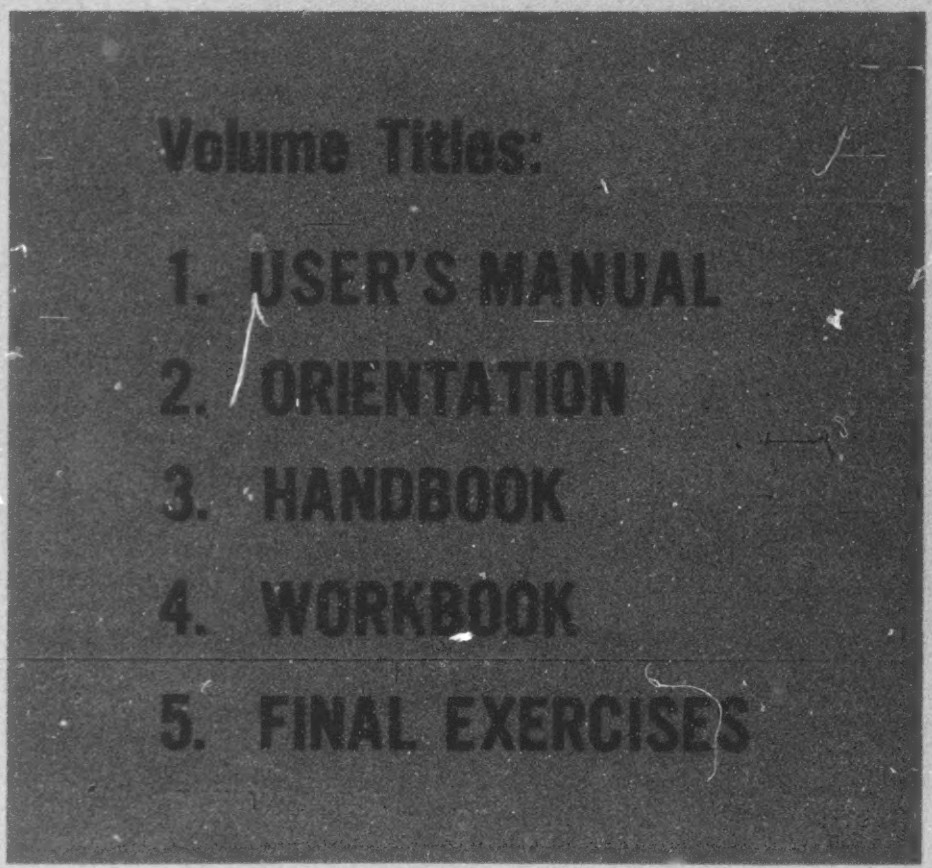
A Technology For Developing Instructional Materials

1 USER'S MANUAL



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A Technology For Developing Instructional Materials

1 USER'S MANUAL

Volume Titles:

1. USER'S MANUAL
2. ORIENTATION
3. HANDBOOK
4. WORKBOOK
5. FINAL EXERCISES

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VOLUMES IN THIS SERIES

1. USER'S MANUAL
2. ORIENTATION
3. HANDBOOK
   (eleven sub-volumes)
4. WORKBOOK
5. FINAL EXERCISES

FOREWORD

This USER'S MANUAL, one of five major and interrelated volumes, provides a description of the materials which are contained in those volumes and which are designed to train educational R&D personnel in the instructional development process. It also provides detailed instructions on how to use the materials. Accordingly, this is the volume the user should read *first*. He should also adhere to the recommended schedule for using the other volumes and their constituent sub-sections.

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U.S.O.E. sponsorship does not in any way imply official endorsement of the views expressed in this volume.

The author is indebted to Miss Kathleen Gubala for her tireless preparation of the complex manuscript required by the total program.

George L. Gropper
March, 1973

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A. INTRODUCTION

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Purpose of the Program

This manual provides instructions on the use of a programmed, self-instructional, transportable training program on "instructional technology." Designed both for novices and for those with experience, the program offers educational R&D personnel guidance to and practice in developing instructional materials and procedures. For the novice it offers a HANDBOOK that contains sections serving separate learning aid and job aid functions. As his experience increases, he need rely less and less on learning aid sections and is able more and more to rely on job aid sections. For those with some experience, this division of functions in the HANDBOOK continues to be meaningful. The on-the-job user need only consult those sections he feels he needs. For the seasoned practitioner, the HANDBOOK offers an innovative model of the instructional development process as well as a "job aid" guide to its implementation. Designed to serve these diverse groups and to serve individuals who will change in proficiency with increasing on-the-job experience, the HANDBOOK is capable of handling wide variations in intra- and inter-individual differences.

The program requires the user, a learner/trainee, to read sections of the HANDBOOK and then to do WORKBOOK exercises targeted for those sections. Following practice designed to build proficiency at separate skills in the development process, the user then puts it all together in FINAL EXERCISES. Here he begins performing much as he would be expected to on the job. For so complex a performance as the entire materials development process, it is not anticipated that completion of the entire program will produce a seasoned, proficient developer of instructional materials. It is anticipated that completion of the entire program *will*, however, produce a seasoned user of the HANDBOOK. The HANDBOOK was designed to serve as a job aid guiding the user on the job in all the procedures in the development process. With continued on-the-job experience, lessened dependence on the HANDBOOK and progressively increasing self-proficiency in the materials development process can be anticipated.

It is worth differentiating between what this program covers and what it does not. The program is designed to train educational R&D personnel to develop instructional materials. It is *not* designed to train them to

verbalize about the procedures they use or about issues concerning those procedures. The practice developers engage in requires them, for example, to develop materials and not to discuss the relative merits of alternative ways of developing materials or the assumptions underlying or rationale for developing materials in a particular way. Proficiency of program graduates is therefore assessed by means of their performance on final exercises (involving developmental activities) or performance on the job and not by means of performance on paper-and-pencil tests covering "principles" about instructional materials development.

Program Components

To provide educational R&D personnel with practical practice opportunities and with the guidance necessary to facilitate the correct practice of development procedures, five major volumes (each color-coded) have been prepared. They are titled:

1. A USER'S MANUAL (this volume)
2. ORIENTATION
3. HANDBOOK (made up of eleven sub-volumes)
4. WORKBOOK
5. FINAL EXERCISES

Each of these volumes serves unique training functions.

The key training function served by the USER'S MANUAL is to make sure that the trainee taking this program follows a prescribed sequence of learning activities (See later section on scheduling). The ORIENTATION volume serves three important functions: it introduces the learner/trainee, in advance of any other program activities, to some key concepts which run through all the major materials development tasks; it also provides the learner/trainee with an overview of all the major tasks, steps, and sub-steps in the development process; and, it also familiarizes the learner/trainee with all the program components and with how they are to be used. The HANDBOOK, as already noted, serves both job aid and learning aid functions. In both capacities, and combined with the WORKBOOK exercises, it facilitates

learner/trainee acquisition, retention, and transfer of the materials development procedures.

The HANDBOOK provides sufficient cuing so that the user can correctly do WORKBOOK exercises associated with each detailed sub-step in the development process and can correctly do FINAL EXERCISES associated with each major task in the development process. It is through both types of practice that the learner/trainee gains proficiency in implementing the development model presented in the HANDBOOK.

Rationale for Program Format

Because materials development is largely a paper-and-pencil activity, creating a training program for materials developers in the same mode appears to be an appropriate and justifiable training strategy. Because producing instructional materials is a difficult activity to learn, creating a program in a variety of practice modes appears to be necessary. Accordingly, WORKBOOK exercises of the production type are preceded by the relatively easier recognition and editing types of practice. Further assistance is provided by illustrative performances or products in the HANDBOOK. The HANDBOOK itself is largely in diagrammatic form, designed specifically to aid the user to acquire the discriminations, generalizations, associations, and chains that make up Sub-STEPS in the development process. For later use on the job, the same materials are available as aids to retention and transfer.

Because producing instructional materials is also a highly complex activity, FINAL EXERCISES have been created which pose for the learner/trainee problems approximating joblike proportions. They are, however, deliberately kept from assuming full joblike proportions so that the learner/trainee can perform them correctly. This assures the practice of correct responses and reinforcement to the learner/trainee. It is on the job that the learner/trainee will eventually practice activities of on-the-job proportions (length, difficulty, complexity). The availability of the HANDBOOK as a job aid for these activities assures the appropriate transfer from training practice to on-the-job practice.

The order in which FINAL EXERCISES, as well as WORKBOOK exercises, are scheduled is the product of a strategy decision specifically aimed at overcoming student difficulties in learning so complex a performance as instructional materials development. The schedule selected calls for the learner/trainee to practice (and to learn) the major tasks in a *backward* order. The learner/trainee first learns to revise already existing materials. Then, he learns to develop his own materials. Next, he learns to formulate instructional strategies. And so on back in the development chain.

The usual rationale for this kind of "backward chaining" centers on its feedback capabilities. With the last step learned, the learner's performance of the next to last step which leads to a correct last step is provided with feedback about *its* correctness. While this process is more likely to be operative for procedures or steps of small scope, it may also be applicable at the macro level, that is to say, at the task level.

In its use in the present program, backward chaining is at the macro, task level. The trainee begins by reading HANDBOOK Sub-volume "J," "evaluate instructional materials," does the WORKBOOK exercises associated with it, and then does a FINAL EXERCISE devoted just to evaluation and revision of instructional materials. When this is completed, the learner/trainee then moves backward to the immediately prior TASK in the chain (to the task of "developing instructional materials") and repeats the same cycle of HANDBOOK and WORKBOOK activities. The last activitiy at this stage is a FINAL EXERCISE devoted to <u>developing</u> instructional materials. This cycle of activities is then sequentially repeated for tasks which appear earlier and earlier in the total chain.

Seven types of FINAL EXERCISE are used in the program, one for each of the following major tasks; students perform the exercises in this order:

1st - J. EVALUATE INSTRUCTIONAL MATERIALS

2nd - I. DEVELOP INSTRUCTIONAL MATERIALS

3rd - G. FORMULATE INSTRUCTIONAL STRATEGIES

4th - F. DEVELOP DIAGNOSTIC AND EVALUATIVE TESTS

5th - E. PLAN SIMULATION BASED ON INSTRUCTIONAL AND LOGISTICAL NEEDS

6th - D. STATE CRITERION AND PREPARATORY OBJECTIVES

7th - B. COLLECT AND ANALYZE DATA ABOUT CRITERION BEHAVIORS

When the learner/trainee performs the final exercise for "J," he is given FORMS which are devoted to each of the six remaining (but prior) tasks in the development process. These FORMS have been filled out. The program which the learner/trainee is expected to revise (in Task J) is presented on FORMS associated with Task I; the strategy which led to the development of the program (to be revised) is presented on FORMS associated with Task G; the tests for the program are presented on FORMS associated with Task F; the simulation decisions (if any) which are reflected both in the program and on tests are presented on FORMS associated with Task E; a statement of objectives which led to test development and to strategy formulation is presented on FORMS associated with Task D; and the analyses (task, learning, performance, and mode) on which all succeeding tasks were based are presented on FORMS associated with Task B. Thus, when practicing revising an already existing program, the learner/trainee has before h'm for review all the preceeding work that went into the development of that program.

When the learner/trainee moves back in the development chain to a FINAL EXERCISE for Task I ("developing instructional materials"), he has already had an opportunity to inspect an example of the product of materials development (i.e., a completed instructional program) on which he can *model* his own performance. Similarly, when he proceeds to the FINAL EXERCISE for Task G, he will already have seen two examples of strategy formulation on which he can model his own performance. The performance of each of the remaining FINAL EXERCISES is similarly preceded by anywhere from one to six examples which can serve as models. Thus, backward chaining, particularly at the macro level, serves not only a "feedback" function but also a "modeling" function.*

Besides feedback and modeling functions, there is an additional function served by backward chaining. It is an <u>overview</u> function. When performing a FINAL EXERCISE for any given task, the trainee has available before him not simply a collection of completed FORMS (completed in prior development tasks). The FORMS, on the contrary, are organized and sequenced in the order in which they are completed. It is a criterion or on-the-job order. As such they constitute a map of (or, in behavioral language, a cue for) the overall

Because the program is taken in a backward order, the learner may be unfamiliar with terminology introduced in early volumes and yet used undefined in later volumes. To offset this problem, a GLOSSARY is provided at the beginning of sub-volume "X" of the HANDBOOK which is titled "INDEX."

development process. It is a repeatedly presented map (i.e. presented in each of several FINAL EXERCISES) which provides the trainee with an orientation not only as to FORMS he will eventually use (i.e. model) for each major TASK but also as to the sequence of activities in which he himself will eventually engage.

The pre-prepared or completed FORMS provided in each backward chained FINAL EXERCISE serves a dual function. Each individual FORM provides a model of how it is to be completed. The series of FORMS provides an overview or map of all development activities. Backward chaining, in addition, also serves a third function, a feedback function.

Portions of seven of the ten major tasks in the development process, as described above, are performed by filling out FORMS. The FORMS serve both learning aid and job aid functions. For both purposes they contain stimulus materials which direct the user's attention to key variables involved in the step or sub-step he is performing. They also contain stimulus materials which serve as criteria for correct and/or complete performance of a step or sub-step. During learning, the FORMS therefore serve essential cuing and feedback functions which facilitate correct and efficient practice. On the job, as the user gains more and more experience, the FORMS remain available to meet his changing needs. However, even when he becomes a seasoned materials developer, the FORMS still can serve a useful checklist/reminder function and a convenient place to record results of his analyses.

Program Content

The HANDBOOK presents a comprehensive instructional technology model. The major or macro tasks in the model are summarized on the covers of all program volumes (except this one). At this level of detail there is considerable overlap between this model and those proposed by others. The overlap is in the major goals. It is at the more detailed procedures or implementation level that the model becomes idiosyncratic. But, here too there is considerable overlap. No effort is made in the HANDBOOK to identify what is overlap and what is not. Educational R&D personnel who go on to gain experience in developing instructional materials and in gaining knowledge about the process will have little difficulty identifying for themselves

where similarity in approach leaves off and innovation begins. Here, however, six state-of-the-art procedures built into the model will be identified.

A user's manual is not the place to explicate or to provide a conceptual underpinning for proposed techniques. It is the place to identify where a technique is used and what purposes it serves.

Section B of the HANDBOOK is devoted to the collection and analysis of data about criterion behaviors. Three innovative approaches are introduced in this section. One simply consists of the use of forms which are useful in the collection of critical incidents, an approach to task description. By requiring respondents to provide specified types of information, clearly identified by the format of the form, it is possible to insure obtaining task description information which is complete, objective, to-the-point, and therefore, usuable.

A second approach, presented in Section B, involves the use of a new learning/performance taxonomy in performing task analyses. The taxonomy meets such internal criteria as: economy, small number of categories, mutually exclusive categories, and amenability to combinations, and such external criteria as: comprehensiveness in covering all types of performance, ability to produce differential recommendations for training, ability to categorize different portions of the same criterion behavior differentially (a horizontal analysis), and ability to categorize hierarchically ordered portions of the criterion behavior (i.e., a vertical analysis of prerequisite behaviors) within the same framework.

Briefly, the taxonomy is dual in nature, covering both learning components and performance requirements. The learning portion of the taxonomy consists of the familiar variables: discriminations, generalizations, associations, and chains. The performance portion consists of recall and transfer requirements both for stimulus and response in each and every S-R association in a total chain.

A third approach presented in Section B is concerned with the vertical identification of more detailed, prerequisite behaviors. The techniques concern themselves with the widely acknowledged problem of how to decide when task analyses have been performed to sufficient levels of detail. Concrete guidelines are offered for ways to make this decision in a systematic way.

Section "D," covering the "statement of objectives," presents a fourth, new approach. It calls for the preparation of a statement of objectives especially designed for *students*. Its purpose is to provide students with an advance organizer that directly reflects *task analysis* results. In non-technical language students are informed of the types of discriminations, generalizations, associations, or chains they will have to acquire. It is an advance organizer which is capable of affecting student study behavior in a radically different way than a conventionally stated objective does. It provides guidelines as to what to look for and criteria for determining whether what is supposed to be learned is, in fact, learned.

Section "G," which is devoted to the "formulation of instructional strategies," describes the availability of seventeen instructional operations which can be used singly or in combination to accommodate all types of learning and performance requirements. These operations are grouped conceptually under the heading of five major "preparatory practice progressions." The heading refers to the progression of practice opportunities which takes the learner from entering to criterion proficiency level. Section "G" provides the learner/trainee with guidelines for selecting one or more of the seventeen types of progressions suitable to the specific type of proficiency he is required to produce in *his* students.

The sixth and final innovative approach is presented in Section "J" on "evaluation of instructional programs." When students complete a program and then take tests on it, the errors they make on tests have generally been thought to be not susceptible to differential diagnosis as to the type of learning failure which has occurred. If the student has failed to acquire or has incorrectly acquired a discrimination, a generalization, or an association, he will, in any of these situations, make the same wrong response on a test. Test results have therefore not been usually treated diagnostically. Approaches to solve this problem are provided in Section "G."

The instructional technology model presented in this program is applicable to instruction designed to teach procedures and to teach subject matter "knowledge." Examples throughout the program (both in the HANDBOOK and in the exercises) are of both types. Accordingly, the model is equally applicable to education (at all grade levels) and to industrial or military training.

Evaluation of the Program

For developmental tryout purposes, the program was administered to three separate groups on three separate occasions (n = 8; n = 6; n = 3). Two of the groups took the program as part of courses offered by the Principal Investigator during a visiting professorship at Florida State University. The program, being self-instructional, allowed students to work at their own pace. Students did, however, follow up independent study with participation in group discussions led by the Principal Investigator. All these activities produced the following types of data: time to complete reading and exercise assignments, errors on workbook exercises, errors on final exercises (constituting criterion-like tasks), and student (open-ended) comments.

All the major sections of the program worked well. Using a cut-off point of "less than 20 percent errors," the percentage of students performing that well or better on WORKBOOK exercises was, except for one major section, in the 70's, 80's, and 90's. The FINAL EXERCISES, in which all the routines and sub-routines treated in isolation in workbook exercises are integrated, produced results superior to that. Student comments were generally favorable. All in all program content worked well. What worked less well were the instructions to students as to how to use the program. Most of the revisions made in the program were in reference to these latter problems.

This program on instructional technology is one of the few for which data are reported. The data and student comments support the view that the program works and that it and the design model have a chance of being adopted and used. It is a transportable, self-instructional program (requiring periodic and partial instructor feedback) which does an effective job of teaching instructional design. It goes without saying that, as would be appropriate for any program, the revised version requires still further cycles of tryout and revision.

B. HOW TO USE THE PROGRAM

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Overview of the Schedule of Activities

Student activities involved in taking this program may be summarized briefly, as follows:

1st - Reading of this manual;

2nd - Referring to (and following) the detailed schedule of activities appearing on page 26 which provides a recommended sequence for the remaining activities described below;

3rd - Reading the ORIENTATION volume and doing the exercises prescribed in it;

4th - Reading all of HANDBOOK subvolume A--for further orientation purposes;

5th - Reading portions of HANDBOOK Section "J" and also doing WORKBOOK exercises associated with them;

6th - Reading additional portions of HANDBOOK Section "J" and doing the WORKBOOK exercises associated with them;

7th - After completing all portions of HANDBOOK Section "J" and their associated WORKBOOK exercises, doing FINAL EXERCISE #1;

8th - Reading portions of HANDBOOK SECTION "I" and doing the WORKBOOK exercises associated with them;

9th - Reading additional portions of HANDBOOK SECTION "I" and doing the WORKBOOK exercises associated with them;

10th - After completing all portions of HANDBOOK Section "I" and their associated WORKBOOK exercises, doing FINAL EXERCISE #2;

11th - Repeat the sequence 5-7 for each prior section of the HANDBOOK, i.e., H, G, F, E, etc.

It should be emphasized at this point that doing and completing WORKBOOK exercises and FINAL EXERCISES is an essential requirement for this program to have its maximal effect.

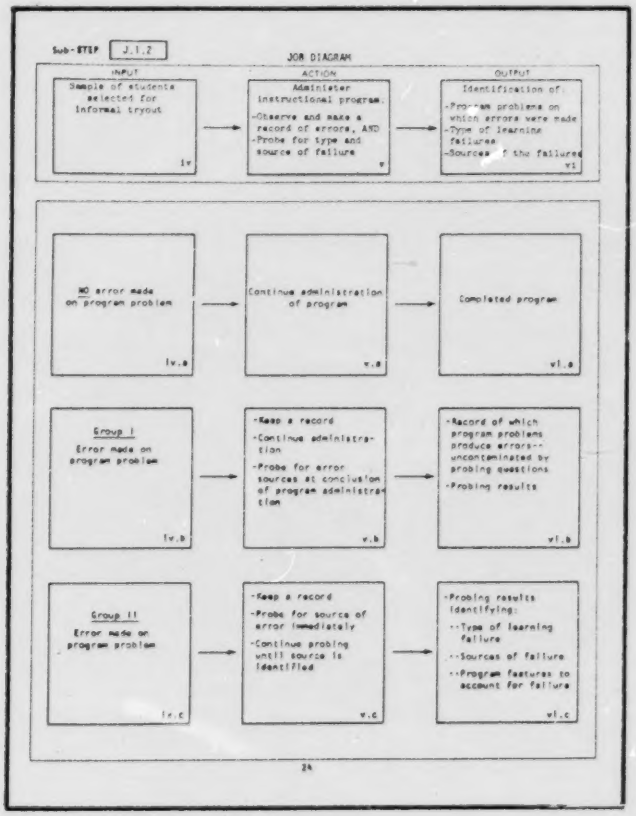
Behavioral Objectives

Each of the ten sub-volumes of the HANDBOOK is divided into sub-sections. The smallest, self-contained sub-section in any of the volumes is devoted to a procedural Sub-STEP. For a given Sub-STEP, the HANDBOOK sub-section devoted to it provides background information about and procedural guidelines for performing it.

There are three types of information available to a trainee taking this program which can help him to identify what the objectives are for HANDBOOK subsections: (1) a job diagram; (2) a summary of job procedures; and (3) WORKBOOK exercises and FINAL EXERCISES.

1. Job Diagrams

The behavioral objectives for a given Sub-STEP are presented in the HANDBOOK in the form of a job diagram like the illustrative one below (taken from the "[illegible]" subvolume).



The bottom part in the job diagram indicates that the developer has to distinguish between three types of situations when conducting an informal tryout of instructional materials: iv.a, iv.b, and iv.c. He further has to associate a particular course of action (v.a, v.b, or v.c) depending on which of the three situations (iv.a, iv.b, or iv.c) he is currently faced with. The diagram, in addition, identifies what the product or outcome has to be (vi.a, vi.b, or vi.c) depending on which one of the three actions he is required to be take.

2. Summary of Job Procedures

At the end of each HANDBOOK subsection, there is a summary description of all the motives and sub-motives the developer should follow when performing the SubSTEP covered in that subsection. An illustrative summary (taken from the same subsection from which the above job diagram was taken) is show below.

#1

LOOK FOR ERRORS

a. Administer instructional program individually to each student in the sample

b. Observe occurrence of error(s) on program problem or task

c. Make a record of occurrence and of the type of error*

d. (OPTIONAL) Use FORM J.2(1) to summarize errors on all program problems

#2

PROBE FOR REASONS FOR ERRORS

a. Use general probes for identifying source of errors:

  ··Start with open-ended probes;

  ··Continue with less open-ended probes;

  ··Use direct probes

b. Use probes to follow up student responses to initial probes

c. Use specific probes to identify specific problems

*On printed programs a record can be kept on a copy of the program itself.

3. Workbook Exercises and Final Exercises

The job diagram and the summary of procedures can orient a trainee or a seasoned developer as to what kinds of information to look for as he reads a HANDBOOK sub-section devoted to a particular Sub-STEP. Another source of orientation are WORKBOOK exercises and FINAL EXERCISES. Just before he reads a HANDBOOK sub-section, the trainee can review practice exercises to determine what will be expected of him when he finishes reading the HANDBOOK sub-section. On the basis of the review, he can make more effective use of the HANDBOOK sub-section which is designed to prepare him to be able to do the exercises. Based on more clearly identified objectives, he may be better oriented to know what to look for in the HANDBOOK.

Work on this program proceeds in a cyclical manner. A trainee reads a sub-section of a HANDBOOK subvolume, does a WORKBOOK exercise based on the sub-section, continues serially with other sub-sections and associated exercises until he completes a whole HANDBOOK subvolume, then he does a FINAL EXERCISE devoted to all the Sub-STEPS in that volume.

In order to be able to do WORKBOOK exercises or to do FINAL EXERCISES, the trainee must first read HANDBOOK sections devoted to them. However, before reading the HANDBOOK, a brief review of what will be expected of him in both types of exercises may make reading of the HANDBOOK more efficient. Based on this view, recommended sequence of activities is diagrammed on the next page.

RECOMMENDED PROCEDURE

	FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH *
Activity	Briefly review the FINAL EXERCISE associated with a given sub-volume of the HANDBOOK.	Briefly review the WORKBOOK exercises associated with the first HANDBOOK subsection you are assigned to read.	Read the first assigned HANDBOOK subsection.	Do the WORKBOOK exercises associated with the HANDBOOK subsection you have just completed reading.	Repeat the cycle of SECOND, THIRD, and FOURTH activities for next subsection in the HANDBOOK -- until all the sections are completed.	Do the FINAL EXERCISE associated with a given HANDBOOK subvolume.
Purpose	To obtain an overview of what you will have to be able to do when you have completed reading all of that sub-volume and have completed all of the WORKBOOK exercises associated with it.	To obtain an overview of what you will have to be able to do when you have completed reading all of that sub-section of and the specific WORKBOOK exercises associated with it.	To learn the procedures involved in performing the SubSTEP covered in that subsection.	To obtain practice in performing the SubSTEP described in that HANDBOOK subsection.	To obtain practice in performing all the separate SubSTEPS described in a given HANDBOOK subvolume.	To obtain practice in performing all the SubSTEPS in a complete and ordered sequence.
Illustrative Example	*Briefly review exercise #1 in the FINAL EXERCISE sub-volume before starting any activity for TASK "J."*	*Briefly review WORKBOOK exercises 2A - 2D before reading HANDBOOK subobjectives:* J.1.1 -- J.1.3	*Read HANDBOOK subsections:* J.1.1 -- J.1.3	*Do WORKBOOK exercises 2A - 2D in the "J" portion of the WORKBOOK.*	*Repeat the cycle 2nd, 3rd, and 4th activity until you have finished reading all HANDBOOK "J" subsections and done the WORKBOOK exercises associated with them.*	*Do FINAL EXERCISE #1 associated with HANDBOOK subvolume "J."*

* *The cycle described above (FIRST through SIXTH) is then repeated for the next scheduled HANDBOOK subvolume, e.g., I; then the next, and the next, until the last scheduled subvolume is completed.*

Feedback for Practice Exercises

There is feedback available to the learner/trainee after he completes problems in each exercise. It appears on the page following the exercise and, in the WORKBOOK, generally, on a facing, opposite page. The learner/trainee should, of course, consult the feedback page only after he has attempted exercise problems.

Most exercises contain multiple problems, all of them usually appearing on a single page. In seeking feedback, the learner/trainee has the option of checking answers after he completes each problem or of checking answers after he has completed all the problems on the page. The former option may be generally preferable (to prevent perpetuation of errors or misconceptions). It is certainly preferable whenever the learner/trainee is uncertain of his answer.

Answers available as feedback are to be treated by the learner/trainee in two ways. For most multiple choice (recognition) practice items, the answers provided are to be considered as the "correct" answers. For some multiple choice practice items, they should be considered as recommended or sample answers. For most production practice items, answers provided should be considered in this latter way. For example, when preparing an instructional strategy, or a test, or an instructional program, the learner/trainee can compare his product with the sample answer provided only for certain formal properties (e.g., completeness, objectivity, etc.) but not for identical content. There are clearly no rights and wrongs. The learner/trainee must rely on judgment for assessing the adequacy of products he has produced. To help him do so, yardsticks (in the HANDBOOK) are available in all areas and at all times.

Evaluating Progress

The learner/trainee can evaluate his progress in terms of his performance on the two types of exercises available in this program: the WORKBOOK exercises and the FINAL EXERCISES. Feedback provided in the WORKBOOK and FINAL EXERCISES volumes serves, therefore, to instruct the learner/trainee not only about the adequacy of his performance on individual problems and on individual exercises but also about the progress he has been making in the program.

It is his ultimate performance on the joblike final exercises, however, which is the key measure of proficiency. And, it is here that his own judgment of self-adequacy is brought face to face with external evidence.

The learner/trainee is required to administer the instructional materials he has prepared to student subjects. *Their* performance provides the most convincing evidence about his own performance. Programs that produce proficiency in *his* students provide evidence of his own proficiency.

Administering the Program

The program is self-instructional and self-administering. Some educational R&D personnel may, therefore, wish to and actually take the program on an individual basis. The program may also be given to groups of students within the framework of formal courses or workshops. Since instructional materials development involves so complex a network of procedures, the availability of an instructor, expert in instructional technology, can enhance the usefulness of the program. He can answer questions which arise and assist in evaluating products for which there are no hard and fast standards. Both of these functions can also be served by fellow learner/trainees.

When the program is taken by groups of learner/trainees, periodic discussion sessions covering specific procedures or specific products (required in WORKBOOK exercises or FINAL EXERCISES) creates a number of instructional opportunities. Members of the group can provide feedback to one another about the adequacy of the procedures they have followed or of the products they have developed. In so doing, they also gain additional experience (by critiquing the performance of others) in making discriminations about the right and wrong (or better and poorer) ways to do things. This technique has been previously demonstrated effective in a teacher training program prepared by the author (Gropper, 1971*).

Available for in-service or pre-service training of educational R&D personnel or of training personnel, this program can, depending on local

*Gropper, G. L. Evaluation of a program to train teachers to manage social and emotional problems in the classroom. Final report. Pittsburgh: American Institutes for Research, 1971.

needs, be administered in a variety of ways. The use of instructors, peer discussions, workshops, or other individually preferred instructional arrangements can do nothing but enhance the usefulness and effectiveness of the program.

A trainee's learning task can be made easier if he is provided with a condensed, simplified overview of the program content he is expected to learn. This is particularly true when a program is long and complex. Before beginning the program, a learner/trainee may wish to read a brief, approximately one-hundred-page volume which provides an overview for this program. The ideal time to do so would be after completing the reading of this volume and before beginning the reading of the ORIENTATION volume which appears as the next assignment on the schedule (on page 26). The ORIENTATION volume provides an overview of how to use this program. The book to be published in January 1974 provides an overview of its content. The availability and use of both overview volumes can markedly enhance the effectiveness of this program.*

*Gropper, G. L. Instructional Strategies. Englewood Cliffs, New Jersey: Educational Technology Publications (expected publication date: January 1974).

C. DETAILED SCHEDULE OF PROGRAM ACTIVITIES

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Time Requirements

Based on tryout data, it is estimated that the program administered on an individual basis requires between thirty-five and fifty hours to complete. If administered on a group basis and if group discussion and group critiquing are added, time requirements will accordingly increase. An appropriate occasion for scheduled group discussions is at the completion of each of the nine FINAL EXERCISES. A one or two hour group session would thus add either nine or eighteen hours to the total time requirements. In college settings, time and work requirements of this magnitude make the program suitable for a typical academic semester or quarter.

A number of optional activities are built into FINAL EXERCISES. When, for example, the trainee is doing a final exercise on "stating objectives," he is also required to continue to and complete the next task (i.e., simulation) in the development process. Thus, for the subject matter for which he has prepared a statement of objectives, he will continue on and make simulation decisions. On an optional basis, he is encouraged to continue the remaining tasks in the development process, i.e., develop tests, formulate a strategy, develop materials, and try them out and revise them. Any training program which turns these options into requirements will increase time requirements accordingly. Trainees under such arrangements will, however, receive a considerable amount of additional, valuable practice in performing the major tasks in the development process. With such an increase in practice and in time requirements, this program can adequately fill two academic semesters.

ASSIGNMENTS

Order	Activities	Volume	Section
1	Review	(1) USER'S MANUAL	All
2	Review and do associated assignments	(2) ORIENTATION	All
3	Read materials (no exercises)	(3) HANDBOOK	"A"* all
4	Read materials and do associated assignments (See page J.i in WORKBOOK for detailed schedule)	(3) HANDBOOK and (4) WORKBOOK	"J"
5	Do Final Exercise #1	(5) FINAL EXERCISES	#1
6	Read materials and do associated assignments (See page I.i in WORKBOOK for detailed schedule)	(3) HANDBOOK and (4) WORKBOOK	"I"
7	Do Final Exercise #2	(5) FINAL EXERCISES	#2
8	Read materials (no exercises)	(3) HANDBOOK	"H"
9	Read materials and do associated assignments (See page G.i in WORKBOOK for detailed schedule)	(3) HANDBOOK and (4) WORKBOOK	"G"
10	Do Final Exercise #3	(5) FINAL EXERCISES	#3
11	Read materials and do associated assignments (See page F.i in WORKBOOK for detailed schedule)	(3) HANDBOOK and (4) WORKBOOK	"F"
12	Do Final Exercise #4	(5) FINAL EXERCISES	#4
13	Read materials and do associated assignments (See page E.i in WORKBOOK for detailed schedule)	(3) HANDBOOK and (4) WORKBOOK	"E"
14	Do Final Exercise #5	(5) FINAL EXERCISES	#5
15	Read materials and do associated assignments (See page D.i in WORKBOOK for detailed schedule)	(3) HANDBOOK and (4) WORKBOOK	"D"

ASSIGNMENTS

(Continued)

Order	Activities	Volume	Section
15	Do Final Exercise #6	(5) FINAL EXERCISES	#6
16	Read materials	(3) HANDBOOK and (4) WORKBOOK	"C"
17	Read materials (no exercises)	(3) HANDBOOK	"B" B.1.1- B.1.5
18	Read materials and do associated assignments (See page B.i in WORKBOOK for detailed schedule)	(3) HANDBOOK and (4) WORKBOOK	"B"
19	Do Final Exercise #7	(5) FINAL EXERCISES	#7
20	Do Final Exercise #8	(5) FINAL EXERCISES	#8
21	Do Final Exercise #9	(5) FINAL EXERCISES	#9

A GLOSSARY appears at the beginning of the "X" volume of the HANDBOOK which is titled INDEX.

**Although this program proceeds in a backward order, i.e., TASKS J, I, H, G, F, E, etc., Subvolume "A" is assigned before "J" in order to allow you to familiarize yourself with a variety of FORMS used repeatedly throughout the entire program. Since "familiarization" is the goal of your reading of Subvolume "A," it is not necessary to try to devote much time to your review or to try to memorize the material in it. Your goal is familiarization and "understanding" of concepts.*